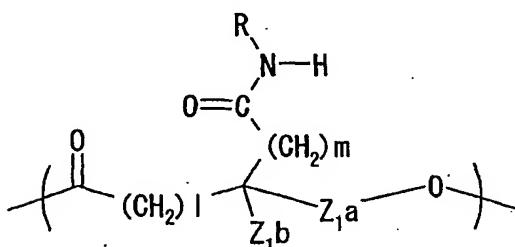


CLAIMS

1. A charge control agent for controlling a charged state of powder, characterized by comprising one or more units each represented by the following 5 chemical formula (1) in a molecule:



(in the formula:

R represents $-A_1-SO_2R_1$;

R₁ represents OH, a halogen atom, ONa, OK, or 10 OR_{1a}; and

R_{1a} and A₁ each independently represent a group having a substituted or unsubstituted aliphatic hydrocarbon structure, a substituted or unsubstituted aromatic ring structure, or a substituted or 15 unsubstituted heterocyclic structure;

in addition, with regard to l, m, Z_{1a}, and Z_{1b} in the formula:

when l represents an integer selected from 2 to 4, Z_{1a} represents nothing or a linear alkylene chain 20 having 1 to 4 carbon atoms, Z_{1b} represents a hydrogen atom, and m represents an integer selected from 0 to 8;

when l represents 1 and Z_{1a} represents a linear

alkylene chain having 1 to 4 carbon atoms, Z_{1b} represents a hydrogen atom and m represents an integer selected from 0 to 8;

when l represents 1 and Z_{1a} represents nothing,

5 Z_{1b} represents a hydrogen atom and m represents 0;

when l represents 0 and Z_{1a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain may be substituted by a linear or branched alkyl group, or an alkyl group containing a

10 residue having any one of a phenyl structure, a thiienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{1b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and m represents an integer selected from 0 to

15 8; and

when l represents 0 and Z_{1a} represents nothing,

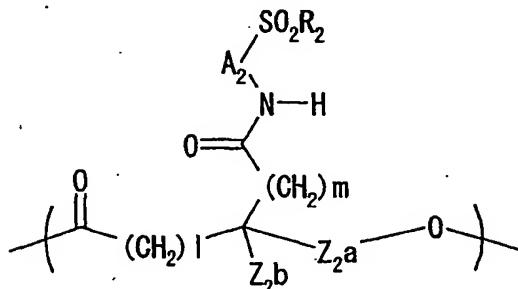
Z_{1b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group

20 which may be substituted by an aryl group, and m represents an integer selected from 0 to 8;

in addition, when multiple units exist, R , R_1 , R_{1a} , A_1 , Z_{1a} , Z_{1b} , l , and m each independently have the above meaning for each unit.)

25 2. A charge control agent according to claim 1, characterized in that the one or more units each represented by the chemical formula (1) are each

represented by the following chemical formula (2):



(in the formula:

R₂ represents OH, a halogen atom, ONa, OK, or

5 OR_{2a}; and

R_{2a} represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group, and A₂ represents a linear or branched alkylene group having 1 to 8 carbon atoms;

in addition, with regard to l, m, Z_{2a}, and Z_{2b} in the formula:

when l represents an integer selected from 2 to 4, Z_{2a} represents nothing or a linear alkylene chain having 1 to 4 carbon atoms, Z_{2b} represents a hydrogen atom, and m represents an integer selected from 0 to 8;

when l represents 1 and Z_{2a} represents a linear alkylene chain having 1 to 4 carbon atoms, Z_{2b} represents a hydrogen atom and m represents an integer selected from 0 to 8;

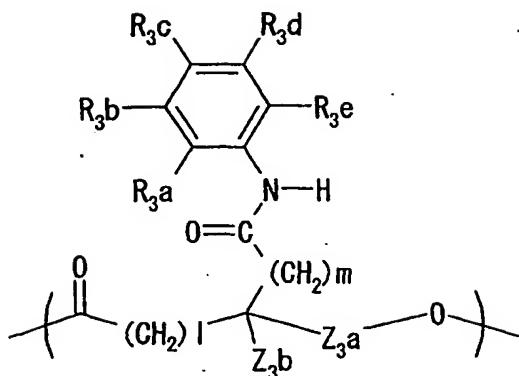
when l represents 1 and Z_{2a} represents nothing,

Z_{2b} represents a hydrogen atom and m represents 0;
when 1 represents 0 and Z_{2a} represents a linear
alkylene chain having 1 to 4 carbon atoms, the linear
alkylene chain may be substituted by a linear or
5 branched alkyl group, or an alkyl group containing a
residue having any one of a phenyl structure, a
thienyl structure, and a cyclohexyl structure at a
terminal thereof, Z_{2b} represents a hydrogen atom, or a
linear or branched alkyl group, aryl group, or
10 aralkyl group which may be substituted by an aryl
group, and m represents an integer selected from 0 to
8; and

when 1 represents 0 and Z_{2a} represents nothing,
 Z_{2b} represents a hydrogen atom, or a linear or
15 branched alkyl group, aryl group, or aralkyl group
which may be substituted by an aryl group, and m
represents an integer selected from 0 to 8;

in addition, when multiple units exist, R_2 , R_{2a} ,
 A_2 , Z_{2a} , Z_{2b} , 1, and m each independently have the
20 above meaning for each unit.)

3. A charge control agent according to claim 1,
characterized in that the one or more units each
represented by the chemical formula (1) are each
represented by the following chemical formula (3):



(in the formula, at least one of R_{3a} , R_{3b} , R_{3c} , R_{3d} , and R_{3e} represents SO_2R_{3f} (R_{3f} represents OH, a halogen atom, ONa , OK , or OR_{3f1} . R_{3f1} represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group.), and the others each independently represent a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{3g}$ (R_{3g} represents an H atom, an Na atom, or a K atom.), an acetamide group, an OPh group, an $NHPh$ group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group;

5 in addition, with regard to l , m , Z_{3a} , and Z_{3b} in the formula:

10 when l represents an integer selected from 2 to 4, Z_{3a} represents nothing or a linear alkylene chain having 1 to 4 carbon atoms, Z_{3b} represents a hydrogen atom, and m represents an integer selected from 0 to 15 8;

15 when l represents 1 and Z_{3a} represents a linear

alkylene chain having 1 to 4 carbon atoms, Z_{3b} represents a hydrogen atom and m represents an integer selected from 0 to 8;

when l represents 1 and Z_{3a} represents nothing,

5 Z_{3b} represents a hydrogen atom and m represents 0;

when l represents 0 and Z_{3a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain may be substituted by a linear or branched alkyl group, or an alkyl group containing a 10 residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{3b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and m represents an integer selected from 0 to 15 8; and

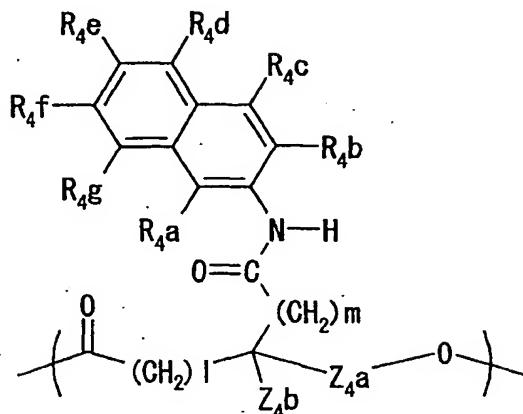
when l represents 0 and Z_{3a} represents nothing,

Z_{3b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group 20 which may be substituted by an aryl group, and m represents an integer selected from 0 to 8;

in addition, when multiple units exist, R_{3a} , R_{3b} , R_{3c} , R_{3d} , R_{3e} , R_{3f} , R_{3f1} , R_{3g} , Z_{3a} , Z_{3b} , l , and m each independently have the above meaning for each unit.)

25 4. A charge control agent according to claim 1, characterized in that the one or more units each represented by the chemical formula (1) are each

represented by the following chemical formula (4A) or (4B):



(in the formula, at least one of R_{4a} , R_{4b} , R_{4c} , R_{4d} , R_{4e} ,
 5 R_{4f} , and R_{4g} represents SO_2R_{4o} (R_{4o} represents OH, a halogen atom, ONa , OK , or OR_{4o1} . R_{4o1} represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group.), and the others each independently represent
 10 a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{4p}$ (R_{4p} represents an H atom, an Na atom, or a K atom.), an acetamide group, an OPh group, an $NHPh$ group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group;
 15 in addition, with regard to l, m, Z_{4a} , and Z_{4b} in the formula:
 when l represents an integer selected from 2 to 4, Z_{4a} represents nothing or a linear alkylene chain
 20 having 1 to 4 carbon atoms, Z_{4b} represents a hydrogen

atom, and m represents an integer selected from 0 to 8;

when l represents 1 and Z_{4a} represents a linear alkylene chain having 1 to 4 carbon atoms, Z_{4b}

5 represents a hydrogen atom and m represents an integer selected from 0 to 8;

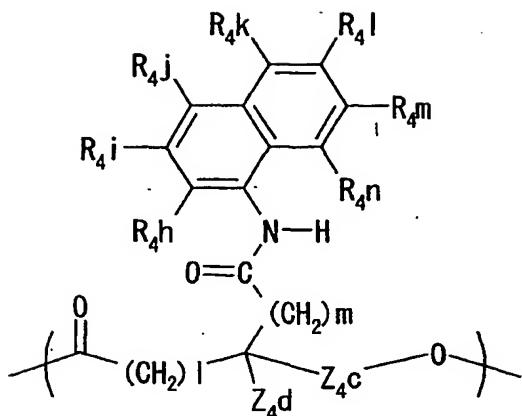
when l represents 1 and Z_{4a} represents nothing, Z_{4b} represents a hydrogen atom and m represents 0;

when l represents 0 and Z_{4a} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain may be substituted by a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thienyl structure, and a cyclohexyl structure at a 10 terminal thereof, Z_{4b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and m represents an integer selected from 0 to 15 8; and

20 when l represents 0 and Z_{4a} represents nothing, Z_{4b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and m represents an integer selected from 0 to 8;

25 in addition, when multiple units exist, R_{4a}, R_{4b}, R_{4c}, R_{4d}, R_{4e}, R_{4f}, R_{4g}, R_{4o}, OR_{4o1}, R_{4p}, Z_{4a}, Z_{4b}, l, and m each independently have the above meaning for each

unit)



(in the formula, at least one of R_{4h} , R_{4i} , R_{4j} , R_{4k} , R_{4l} , R_{4m} , and R_{4n} represents SO_2R_{40} (R_{40} represents OH, a halogen atom, ONa, OK, or OR_{401} . R_{401} represents a linear or branched alkyl group having 1 to 8 carbon atoms, or a substituted or unsubstituted phenyl group.), and the others each independently represent a hydrogen atom, a halogen atom, an alkyl group having 1 to 20 carbon atoms, an alkoxy group having 1 to 20 carbon atoms, an OH group, an NH_2 group, an NO_2 group, $COOR_{4p}$ (R_{4p} represents an H atom, an Na atom, or a K atom.), an acetamide group, an OPh group, an $NHPh$ group, a CF_3 group, a C_2F_5 group, or a C_3F_7 group;

10 in addition, with regard to l , m , Z_{4c} , and Z_{4d} in the formula:

when l represents an integer selected from 2 to 4, Z_{4c} represents nothing or a linear alkylene chain having 1 to 4 carbon atoms, Z_{4d} represents a hydrogen atom, and m represents an integer selected from 0 to

8;

when l represents 1 and Z_{4c} represents a linear alkylene chain having 1 to 4 carbon atoms, Z_{4d} represents a hydrogen atom and m represents an 5 integer selected from 0 to 8;

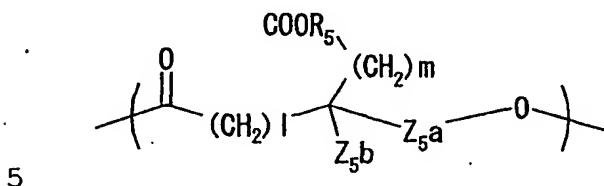
when l represents 1 and Z_{4c} represents nothing, Z_{4d} represents a hydrogen atom and m represents 0;

when l represents 0 and Z_{4c} represents a linear alkylene chain having 1 to 4 carbon atoms, the linear 10 alkylene chain may be substituted by a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a thiienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{4d} represents a hydrogen atom, or a 15 linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and m represents an integer selected from 0 to 8; and

when l represents 0 and Z_{4c} represents nothing, 20 Z_{4d} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and m represents an integer selected from 0 to 8;

in addition, when multiple units exist, R_{4h} , R_{4i} , 25 R_{4j} , R_{4k} , R_{4l} , R_{4m} , R_{4n} , R_{4o} , OR_{4o1} , R_{4p} , Z_{4c} , Z_{4d} , l, and m each independently have the above meaning for each unit.)

5. A charge control agent for controlling a charged state of powder, characterized by comprising one or more units each represented by the following chemical formula (5) in a molecule:



(in the formula:

R₅ represents hydrogen, a group for forming a salt, or R_{5a}, and R_{5a} represents a linear or branched alkyl group having 1 to 12 carbon atoms, or aralkyl group;

in addition, with regard to l, m, Z_{5a}, and Z_{5b} in the formula:

when l represents an integer selected from 2 to 4, Z_{5a} represents nothing or a linear alkylene chain having 1 to 4 carbon atoms, Z_{5b} represents a hydrogen atom, and m represents an integer selected from 0 to 8;

when l represents 1 and Z_{5a} represents a linear alkylene chain having 1 to 4 carbon atoms, Z_{5b} represents a hydrogen atom and m represents an integer selected from 0 to 8;

when l represents 1 and Z_{5a} represents nothing, Z_{5b} represents a hydrogen atom and m represents 0;

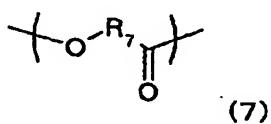
when l represents 0 and Z_{5a} represents a linear

alkylene chain having 1 to 4 carbon atoms, the linear alkylene chain may be substituted by a linear or branched alkyl group, or an alkyl group containing a residue having any one of a phenyl structure, a 5 thienyl structure, and a cyclohexyl structure at a terminal thereof, Z_{5b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and m represents an integer selected from 0 to 10 8; and

when 1 represents 0 and Z_{5a} represents nothing, Z_{5b} represents a hydrogen atom, or a linear or branched alkyl group, aryl group, or aralkyl group which may be substituted by an aryl group, and m 15 represents an integer selected from 0 to 8;

in addition, when multiple units exist, R_5 , R_{5a} , Z_{5a} , Z_{5b} , 1, and m each independently have the above meaning for each unit.)

6. A charge control agent according to any one 20 of claims 1 to 5, characterized by further comprising a unit represented by the following chemical formula (7) in a molecule:



(in the formula, R_7 represents a linear or branched

alkylene group having 1 to 11 carbon atoms, an alkyleneoxyalkylene group each alkylene of which has 1 to 2 carbon atoms, or an alkylidene group having 1 to 5 carbon atoms which may be substituted by aryl as 5 desired;

in addition, when multiple units exist, R₇ independently has the above meaning for each unit.)

7. A charge control agent according to any one of claims 1 to 6, wherein the powder comprises toner 10 for developing an electrostatic charge image.

8. A toner for developing an electrostatic charge image, characterized by comprising at least:

a binder resin;

a colorant; and

15 the charge control agent according to any one of claims 1 to 6.

9. An image forming method, comprising at least the steps of:

20 applying a voltage from an outside to a charging member to charge an electrostatic latent image-bearing member;

forming an electrostatic charge image on the charged electrostatic latent image-bearing member;

25 developing the electrostatic charge image with toner for developing an electrostatic charge image to form a toner image on the electrostatic latent image-bearing member;

transferring the toner image on the electrostatic latent image-bearing member onto a recording material; and

fixing the toner image on the recording material
5 under heating, characterized in that the toner for developing an electrostatic charge image according to claim 8 is used.

10. An image forming apparatus, comprising at least:

10 means for applying a voltage from an outside to a charging member to charge an electrostatic latent image-bearing member;

means for forming an electrostatic charge image on the charged electrostatic latent image-bearing
15 member;

means for developing the electrostatic charge image with toner for developing an electrostatic charge image to form a toner image on the electrostatic latent image-bearing member;

20 means for transferring the toner image on the electrostatic latent image-bearing member onto a recording material; and

means for fixing the toner image on the recording material under heating, characterized in
25 that the toner for developing an electrostatic charge image according to claim 8 is used.